

**REMARKS**

Claims 1-4 are pending in the captioned application with claims 1 and 2 being amended.

A telephonic Interview was held with the Examiner on January 07, 2003, and Applicants would like to take this time to thank the Examiner for her time and comments. During the Interview, the Examiner stated that additional claim limitations regarding the catalytic activity under particular polymerization conditions would be favorably considered.

Accordingly, Applicants have amended claims 1 and 2 to contain particular limitations regarding the catalytic activity under particular polymerization conditions. *Support* for the limitations can be found in the specification at page 32 on lines 16-25. *Support* No new matter within the meaning of §132 has been included by any of the amendments.

Accordingly, Applicants respectfully request the Examiner to reconsider and allow all claims pending in this application.

**1. Rejection of claims 2 and 3 under**  
**35 U.S.C. §112**

The Office Action rejects claims 2 and 3 under 35 U.S.C. §112, 2<sup>nd</sup> paragraph, as being indefinite for failing to

particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Office Action states:

In claim 2, page 46, line 25 to page 47, line 6, the limitations regarding the addition of organosilicon (c) and temperature are confusing because of the following: (a) as it is written, the description of "wherein the organosilicon compound...the magnesium compound (a) "refers to the organosilicon (c) in the contact product (i); however, applicants seem to intend to claim the organosilicon (c) as additional component rather than what is already in component (i). The Examiner suggests replacing "wherein the" in line 25 with --to which additional--. (b) The Examiner simply cannot figure out the temperature limitation here. The applicants are requested to rewrite the temperature limitation "while the temperature of ...after the elevation of the temperature is completed" in plain and straight forward English, so the examiner will be able to understand the contacting temperature limitation of (i) and additional (c).

Applicants respectfully traverse this rejection. However, for the sole purpose of expediting prosecution, Applicants have amended claims 2 and 3 according to the Examiner's suggestion.

Accordingly, Applicants respectfully submit that claims 2 and 3 particularly point out and distinctly claim the subject matter of the claimed invention and request withdrawal of the rejection under 35 U.S.C. §112, 2<sup>nd</sup> paragraph.

2. Rejection of claims 1-4 under  
35 U.S.C. 103(a)

The Office Action rejects claims 1-4 under 35 U.S.C. §103 (a) as being unpatentable over Sasaki (U.S. 4,891,411) or Kioka (U.S. 4,952,649) or Cuffiana et al. (U.S. 5,278,118). The Office Action states:

Sasaki discloses all the essential limitations of the instant claims, except that the reference does not have a working example using the claimed Si/Mg molar ratio and the temperature heating range (col. 2, lines 6-15; col. 3, lines 66-68; col. 4, lines 47-49 and 62-64; col. 5, lines 1-5; and Example 1).

Thus, the reference teaches contacting a liquid magnesium compound with a liquid titanium compound (the tetrabutoxy titanium compound used in the working Examples is liquid) in the presence of an organosilicon compound having no active hydrogen in a Si/Mg molar ratio that encompasses the claimed range and then elevating the temperature to a range encompassing the claimed range.

. . .

Kioka discloses all the essential limitations of instant claims, except that the reference does not have a working example within the claimed Si/Mg molar ratio and heating temperature range (col. 1, lines 41-63; col. 7, lines 40-42; col. 9, lines 5-11; col. 10, lines 19-35; and Examples 32, 33 and 36).

The catalyst of Example 36 differs from that

of claim 1 in that the Si/Mg ratio was 0.15/1 instead of 0.25/1 to 0.35/1.

However, it would have been obvious to one of ordinary skill in the art to use the claimed Si/Mg ratio in the catalyst of Example 36 because (1) the reference teaches such ratios, (2) ratios of 0.3/1 of reactants (D)/Mg((D) reactants are certain electron donors including the claimed organosilicon compound(s) are disclosed in Examples 32 and 33, and in the absence showing of criticality and unexpected results.

Cuffiana discloses all the essential limitations of the instant claims, except that the reference does not have a working example coming within the scope of the claims (col. 2, lines 21-24 and 43-50; col. 3, lines 38-40, col. 4, lines 12-30 and 41-43; and Example A1). Thus, the reference teaches converting a magnesium compound such as magnesium dichloride into a liquid compound by reaction with aluminum ethyldichloride, contacting the solution with a liquid titanium compound (titanium tetrabutoxide) in the presence of an electron donor which can be the claimed organosilicon compound in Si/Mg ratio of 0.1/1 to /1 and heating the resulting mixture at temperatures of 20-200°C, e.g., 60°C in Example A1.

Applicants respectfully traverse this rejection because the cited references fail to establish all three prongs necessary for a *prima facie* case of obviousness over the presently pending claims. Specifically, the cited references fail to teach the claimed Si/Mg molar ratio and the temperature heating range for

the claimed catalyst having a catalytic activity of 44,000 g-polymer/g-catalyst or above and a ratio of powdery polymer having a particle size of less than 100  $\mu\text{m}$  of 1.5% by weight or below when used to polymerize ethylene for 2 hours at a temperature of 80°C and a partial pressure of ethylene of 4.0 kg/cm<sup>2</sup>-G. Moreover, one of ordinary skill in the art would not have been motivated to make any of the claimed limitations based on the disclosure.

Turning to the rule, the Federal Circuit held that a *prima facie* case of obviousness must establish: (1) some suggestion or motivation to modify the references; (2) a reasonable expectation of success; and (3) that the prior art references teach or suggest all claim limitations. Amgen, Inc. v. Chugai Pharm. Co., 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 USPQ 494, 496 (C.C.P.A. 1970).

A *prima facie* case of obviousness must also include a showing of the reasons why it would be obvious to modify the references to produce the present invention. See Ex parte Clapp, 277 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). The Examiner bears the initial burden to provide some convincing line of reasoning as to why the artisan would have found the

claimed invention to have been obvious in light of the teachings. Id. at 974.

In the present application, claim 1 recites a liquid magnesium compound contacted with a liquid titanium compound in the presence of an organosilicon compound having no active hydrogen in an amount of 0.25 to 0.35 mol based on 1 mol of the magnesium compound wherein the catalyst has a catalytic activity of 44,000 g-polymer/g-catalyst or above and a ratio of powdery polymer having a particle size of less than 100  $\mu\text{m}$  of 1.5% by weight or below when used to polymerize ethylene for 2 hours at a temperature of 80°C and a partial pressure of ethylene of 4.0 kg/cm<sup>2</sup>-G.

Nowhere do any of the cited references teach each and every claimed limitation. Additionally, as the Examiner herself acknowledges, one of ordinary skill in the art would not have been motivated to make the presently claimed invention because of the unpredictable nature of activity behavior under specific polymerization conditions. Clearly, a *prima facie* case of obviousness does not exist against the presently pending claims.

Accordingly, Applicants respectfully submit that the presently claimed invention is unobvious over the cited references and respectfully request reconsideration and


withdrawal of the rejections of claims 1-4 under 35 U.S.C. §103.

**CONCLUSION**

In light of the foregoing, Applicants submit that the application is now in condition for allowance. The Examiner is therefore respectfully requested to reconsider and withdraw the rejection of the pending claims and allow the pending claims. Favorable action with an early allowance of the claims pending is earnestly solicited.

Respectfully submitted,

**SHERMAN & SHALLOWAY**

  
Attorney for Applicants  
Roger C. Hahn  
Reg. No. 46,376

**SHERMAN AND SHALLOWAY**  
P.O. Box 788  
Alexandria, Virginia 22313  
(703) 549-2282



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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: )  
YASHIKI; MINAMI ) Group Art Unit: 1713  
Serial No. 10/025,548 ) Examiner: Lu, Caixia  
Filed: December 26, 2001 )

For: **SOLID TITANIUM CATALYST COMPONENT, ETHYLENE POLYMERIZATION  
CATALYST CONTAINING THE SAME, AND ETHYLENE POLYMERIZATION  
PROCESS**

APPENDIX A

Please amend the following claims as indicated in the  
following marked-up copy of the amended claims.

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1. (Currently amended) A solid titanium catalyst component  
being obtained by a process comprising:

61 a step of bringing (a) a liquid magnesium compound into  
contact with (b) a liquid titanium compound in the presence of  
(c) an organosilicon compound having no active hydrogen in an  
amount of 0.25 to 0.35 mol based on 1 mol of the magnesium  
compound (a); and

a step of elevating the temperature of the resulting  
contact product (i) to a temperature of 105 to 115°C and  
maintaining the contact product (i) at this temperature,



said solid titanium catalyst component comprising magnesium, titanium, halogen and the organosilicon compound having no active hydrogen (c), and having a catalytic activity of 44,000 g-polymer/g-catalyst or above and a ratio of powdery polymer having a particle size of less than 100  $\mu$ m of 1.5% by weight or below when used to polymerize ethylene for 2 hours at a temperature of 80°C and a partial pressure of ethylene of 4.0 kg/cm<sup>2</sup>-G.

2. (Currently amended) A solid titanium catalyst component being obtained by a process comprising:

*Q1*  
*Ans*  
a step of bridging (a) a liquid magnesium compound into contact with (b) a liquid titanium compound in the presence of (c) an organosilicon compound having no active hydrogen in an amount of 0.25 to 0.35 mol based on 1 mol of the magnesium compound (a); and

a step of elevating the temperature of the resulting contact product (i) to maintain the contact product (i) at a given temperature (T1) of 105 to 115°C, ~~wherein the~~ to which additional organosilicon compound having no active hydrogen (c)

is added in an amount of not more than 0.5 mol based on 1 mol of the magnesium compound (a) ~~while the temperature of the contact product (i) is elevated from a temperature lower by 10°C than the temperature maintained to a temperature at which the elevation of the temperature is completed, or after the elevation of the temperature is completed,~~ during the elevation of the temperature from T1 - 10°C to T1, or after the completion of the temperature elevation, so as to bring the compound (c) into contact with the contact product (i),

*A Cont* said solid titanium catalyst component comprising magnesium, titanium, halogen and the organosilicon compound having no active hydrogen (c), and having a catalytic activity of 44,000 g-polymer/g-catalyst or above and a ratio of powdery polymer having a particle size of less than 100 μm of 1.5% by weight or below when used to polymerize ethylene for 2 hours at a temperature of 80°C and a partial pressure of ethylene of 4.0 kg/cm<sup>2</sup>-G.

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3. (Original) An ethylene polymerization catalyst comprising:

[I] the solid titanium catalyst component as claimed in any one of claims 1 and 2, and

[II] an organometallic compound.

4. (Original) An ethylene polymerization process comprising polymerizing ethylene or copolymerizing ethylene and a comonomer in the presence of the catalyst as claimed in claim 3.